RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

VERTEX STANDARD CO., LTD.

PORTABLE FM UHF PTT RADIO TRANSCEIVER

MODEL(S):
VX-P921-G8-5, VX-P924-G8-5, VX-P929-G8-5
VX-P971-G8-5, VX-P974-G8-5, VX-P979-G8-5

FCC ID: K6610334821

IC: 511B-10334821

Test Report Serial Number

021606K66-T723-S90U

Test Report Issue No.

S723-031306-R0

Test Lab

Celltech Compliance Testing & Engineering Lab
(Celltech Labs Inc.)
1955 Moss Court
Kelowna, BC
Canada
V1Y 9L3

Test Report Prepared By:	Test Report Approved By:
Cheri Frangiadakis	
Cheri Frangiadakis Test Report Writer Celltech Labs Inc.	Jonathan Hughes General Manager Celltech Labs Inc.

DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

CELLTECH LABS INC.
Testing and Engineering Services
1955 Moss Court
Kelowna, B.C.
Canada V1Y 9L3
Phone: 250-448-7047
Fax: 250-448-7046
e-mail: info@celltechlabs.com
web site: www.celltechlabs.com

Applicant Information

VERTEX STANDARD CO., LTD.
4-8-8 Nakameguro, Meguro-Ku
Tokyo 153-8644
Japan

FCC IDENTIFIER:	**K6610334821**
IC IDENTIFIER:	**511B-10334821**
Model(s):	**VX-P921-G8-5, VX-P924-G8-5, VX-P929-G8-5, VX-P971-G8-5, VX-P974-G8-5, VX-P979-G8-5**
SAR Test Requirement(s):	**FCC 47 CFR §2.1093; Health Canada Safety Code 6**
SAR Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (Edition 01-01)** **Industry Canada RSS-102 Issue 2**
Device Classification:	**Licensed Non-Broadcast Transmitter Held to Face (TNF)**
Device Description:	**Portable FM UHF PTT Radio Transceiver**
Modulation Type:	**FM (UHF)**
Transmit Frequency Range:	**380 - 450 MHz**
Max. RF Output Power Measured:	**4.8 Watts (36.8 dBm) Conducted (380 MHz)** **4.9 Watts (36.9 dBm) Conducted (415 MHz)** **5.0 Watts (37.0 dBm) Conducted (450 MHz)**
Antenna Type(s) Tested:	**Whip (P/N: ATU-6A1)**
Battery Type(s) Tested:	**Li-ion 7.4 V 1150 mAh (P/N: FNB-V86LI)** **Li-ion 7.4 V 2000 mAh (P/N: FNB-V87LI)** **Li-ion 7.4 V 3000 mAh (P/N: FNB-V92LIIS)** **Alkaline 1.5 V 2850 mAh (Duracell Procell AA x6)** **Alkaline Battery Case (P/N: FBA-34)**
Body-Worn Accessories Tested:	**Plastic Belt-Clip with Metal Spring (P/N: CLIP-920)** **Leather Case with Swivel Belt-Loop (P/N: LCC-920S)** **Leather Case with Belt-Loop (P/N: LCC-920)**
Audio Accessories Tested:	**Speaker-Microphone (P/N: MH-65B7A)**
Max. SAR Level(s) Evaluated:	**Face-held: 3.35 W/kg (1g) - 50% Duty Cycle** **Body-worn: 6.00 W/kg (1g) - 50% Duty Cycle**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102 Issue 2 for the Occupational / Controlled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer's recommendations.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By:	Reviewed By:
Sean Johnston Compliance Technologist Celltech Labs Inc.	Spencer Watson Senior Compliance Technologist Celltech Labs Inc.

TABLE OF CONTENTS

1.0 INTRODUCTION

This measurement report demonstrates compliance of the Vertex Standard Co., Ltd. Models: VX-P921-G8-5, VX-P924-G8-5, VX-P929-G8-5, VX-P971-G8-5, VX-P974-G8-5, VX-P979-G8-5 Portable FM UHF PTT Radio Transceiver FCC ID: K6610334821 with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C (Edition 01-01) (see reference [3]) and IC RSS-102 Issue 2 (see reference [4]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

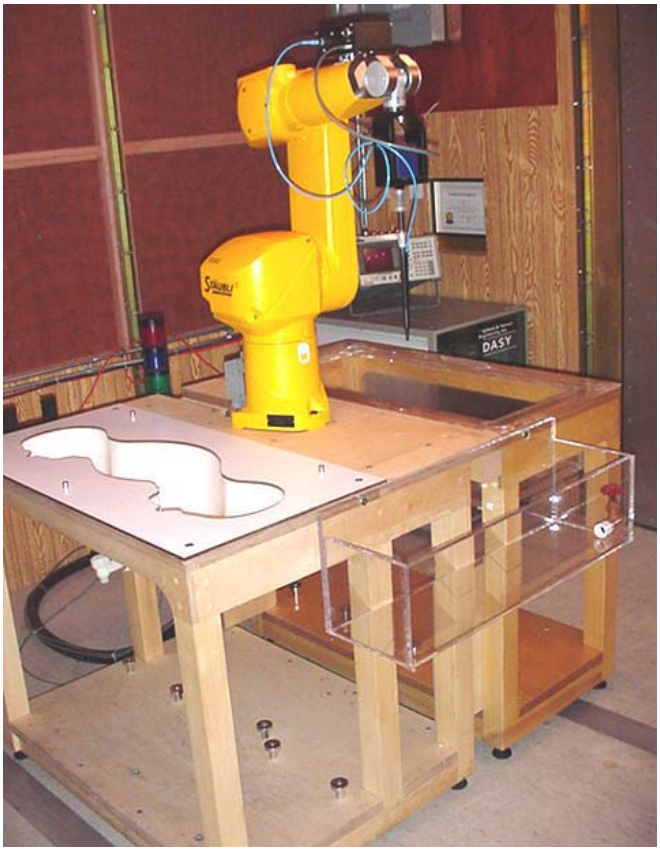
2.0 DESCRIPTION OF DEVICE UNDER TEST (DUT)

SAR Test Requirement(s)	FCC Rule Part 47 CFR §2.1093			
	Health Canada Safety Code 6			
SAR Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)			
	Industry Canada RSS-102 Issue 2			
FCC Device Classification	Licensed Non-Broadcast Transmitter Held to Face (TNF)			
IC Device Classification	Land Mobile Radio Transmitter (RSS-119)			
Device Description	Portable FM UHF PTT Radio Transceiver			
RF Exposure Category	Occupational / Controlled Environment			
FCC IDENTIFIER	K6610334821			
IC IDENTIFER	511B-10334821			
Model(s)	VX-P921-G8-5	VX-P924-G8-5	VX-P929-G8-5	
	VX-P971-G8-5	VX-P974-G8-5	VX-P979-G8-5	
Serial No. of Test Sample	6C000001	Production Unit		
Modulation Type	FM (UHF)			
Transmit Frequency Range	380 - 450 MHz			
Max. RF Output Power Measured	4.8 Watts	36.8 dBm	380 MHz	Conducted
	4.9 Watts	36.9 dBm	415 MHz	Conducted
	5.0 Watts	37.0 dBm	450 MHz	Conducted
Battery Type(s) Tested	Lithium-ion	7.4 V	1150 mAh	P/N: FNB-V86LI
	Lithium-ion	7.4 V	2000 mAh	P/N: FNB-V87LI
	Lithium-ion Intrinsically Safe	7.4 V	3000 mAh	P/N: FNB-V92LIIS
	Alkaline Batteries (6x AA)	9 V	2850 mAh	P/N: FBA-34 (Case)
Antenna Type(s) Tested	Whip	380 - 450 MHz	Length: 165 mm	P/N: ATU-6A1
Body-Worn Accessories Tested	Belt-Clip (Plastic with Metal Spring)			P/N: CLIP-920
	Leather Case with Detachable Swivel Belt-Loop			P/N: LCC-920S
	Leather Case with Belt-Loop			P/N: LCC-920
Audio Accessories Tested	Speaker-Microphone			P/N: MH-65B7A

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY4 SAR Measurement System with Plexiglas validation phantom



DASY4 SAR Measurement System with Plexiglas side planar phantom

4.0 MEASUREMENT SUMMARY

FACE-HELD SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Antenna Position	Battery Tested		Separation Distance to Planar Phantom (cm)	Cond. Power (Watts)	Measured SAR 1g (W/kg)		SAR Drift During Test (dB)	Scaled SAR with droop 1g (W/kg)	
								Duty Cycle			Duty Cycle	
				Type	mAh			100%	50%		100%	50%
415	Mid	CW	Fixed	Li-ion	1150	2.5	4.9	5.79	2.90	-0.317	6.23	3.11
415	Mid	CW	Fixed	Li-ion	2000	2.5	4.9	6.25	3.13	-0.255	6.63	3.31
415	Mid	CW	Fixed	Li-ion	3000	2.5	4.9	6.43	3.22	-0.177	6.70	**3.35**
415	Mid	CW	Fixed	Alkaline	2850	2.5	4.5	2.70	1.35	-0.975	3.38	1.69
ANSI / IEEE C95.1 1999 SAFETY LIMIT				**BRAIN: 8.0 W/kg (averaged over 1 gram)**				**Spatial Peak Controlled Exposure / Occupational**				

Test Date	February 27, 2006				**Relative Humidity**	30	%
Measured Fluid Type	**450 MHz Brain**				**Atmospheric Pressure**	102.1	kPa
Dielectric Constant ε_r	**IEEE Target**		**Measured**	**Deviation**	**Ambient Temperature**	22.7	°C
	43.5	**± 5%**	42.8	-1.6%	**Fluid Temperature**	21.9	°C
Conductivity σ (mho/m)	**IEEE Target**		**Measured**	**Deviation**	**Fluid Depth**	≥ 15	Cm
	0.87	**± 5%**	0.83	-4.6%	**ρ (Kg/m^3)**	1000	

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional per FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]).
3. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
4. The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
5. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
6. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
7. The SAR evaluations were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Antenna Position	Battery Tested		Accessories Tested		Separ. Distance to Planar Phantom (cm)	Cond. Power (Watts)	Measured SAR 1g (W/kg)		SAR Drift During Test (dB)	Scaled SAR with droop 1g (W/kg)	
										Duty Cycle			Duty Cycle	
				Type	mAh	Body-worn	Audio			100%	50%		100%	50%
415	Mid	CW	Fixed	Li-ion	1150	Belt-Clip	Speaker-Mic	1.2	4.9	9.39	4.70	-0.324	10.1	5.06
415	Mid	CW	Fixed	Li-ion	2000	Belt-Clip	Speaker-Mic	1.2	4.9	10.8	5.40	-0.337	11.7	5.84
415	Mid	CW	Fixed	Li-ion	3000	Belt-Clip	Speaker-Mic	1.2	4.9	11.0	5.50	-0.193	11.5	5.75
415	Mid	CW	Fixed	Alkaline	2850	Belt-Clip	Speaker-Mic	0.9	4.5	6.30	3.15	-0.835	7.64	3.82
450	High	CW	Fixed	Li-ion	2000	Belt-Clip	Speaker-Mic	1.2	5.0	4.80	2.40	-0.486	5.37	2.68
380	Low	CW	Fixed	Li-ion	2000	Belt-Clip	Speaker-Mic	1.2	4.8	11.5	5.75	-0.188	12.0	**6.00**
380	Low	CW	Fixed	Li-ion	2000	Leather Case 1	Speaker-Mic	4.5	4.8	5.07	2.54	-0.244	5.36	2.68
380	Low	CW	Fixed	Li-ion	2000	Leather Case 2	Speaker-Mic	2.0	4.8	8.82	4.41	-0.179	9.19	4.60
ANSI / IEEE C95.1 1999 - SAFETY LIMIT				**BODY: 8.0 W/kg (averaged over 1 gram)**					**Spatial Peak - Controlled Exposure / Occupational**					

Test Date	February 24, 2006				Relative Humidity	30	%
Measured Fluid Type	450 MHz Body				Atmospheric Pressure	102.9	kPa
Dielectric Constant ε_r	IEEE Target		Measured	Deviation	Ambient Temperature	23.6	°C
	56.7	± 5%	55.7	-1.8%	Fluid Temperature	22.1	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth	≥ 15	cm
	0.94	± 5%	0.91	-3.2%	ρ (Kg/m^3)	1000	

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional per FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]).
3. The two leather case accessories were evaluated with the worst-case battery type evaluated with the belt-clip accessory. Please note that the Li-ion IS 3000 mAh Battery Pack (P/N: FNB-V92LIIS) and Alkaline Battery Case (P/N: FBA-34) are not intended for use with the leather case accessories. All body-worn accessories contain metallic components and the belt-clip provides the minimum separation distance between the back of the radio and the planar phantom.
4. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
5. The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
6. A SAR-versus-Time power droop evaluation was performed in the test configuration that reported the maximum-scaled SAR level. See Appendix A (SAR Test Plots) for SAR-versus-Time power droop evaluation plot.
7. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
8. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
9. The SAR evaluations were performed within 24 hours of the system performance check.

Leather Case 1 = Leather Case with detachable swivel belt-loop (P/N: LCC-920S)
Leather Case 2 = Leather Case with belt-loop (P/N: LCC-920)

5.0 DETAILS OF SAR EVALUATION

The Vertex Standard Co., Ltd. Models: VX-P921-G8-5, VX-P924-G8-5, VX-P929-G8-5, VX-P971-G8-5, VX-P974-G8-5, VX-P979-G8-5 FM UHF PTT Radio Transceiver FCC ID: K6610334821 was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.

1. The DUT was evaluated in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm separation distance was maintained between the front side of the DUT and the outer surface of the planar phantom.
2. The DUT was evaluated in a body-worn configuration with the back of the radio placed parallel to the outer surface of the planar phantom. The attached belt-clip accessory (P/N: CLIP-920) was touching the planar phantom and provided a separation distance from the back of the DUT and the outer surface of the planar phantom, which was a varying separation distance depending on the thickness of the battery type under test. The DUT was evaluated for body-worn SAR with the speaker-microphone accessory connected to the audio port.
3. The DUT was tested in a body-worn configuration with the radio placed inside the Leather Case with Detachable Swivel Belt-Loop accessory (P/N: LCC-920S) and the back of the radio facing parallel to the outer surface of the planar phantom. The back of the Belt-Loop accessory was touching the outer surface of the planar phantom and with the leather case it provided a combined separation distance of 4.5 cm between the back of the DUT and the outer surface of the planar phantom. The DUT was evaluated for body-worn SAR with the speaker-microphone accessory connected to the audio port.
4. The DUT was tested in a body-worn configuration with the radio placed inside the Leather Case with Belt-Loop accessory (P/N: LCC-920) and the back of the radio facing parallel to the outer surface of the planar phantom. The back of the Leather Case and Belt-Loop were touching the outer surface of the planar phantom and provided a 2.0 cm separation distance between the back of the DUT and the outer surface of the planar phantom. The DUT was evaluated for body-worn SAR with the speaker-microphone accessory connected to the audio port.
5. The conducted power levels were measured prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046.
6. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
7. The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.
8. The DUT was tested in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.
9. The SAR evaluations were performed using a Plexiglas planar phantom.
10. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter checks and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
11. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
12. The SAR evaluations were performed within 24 hours of the system performance check.

6.0 EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

e. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.

f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

Face-Held SAR Test Setup Configuration

Body-Worn SAR Test Setup Configuration

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed using a planar phantom with a 450 MHz dipole (see Appendix E for system validation procedures). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system performance check test plots).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ε_r			Conductivity σ (mho/m)			ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
2/24/06	450MHz Brain	1.23 ±10%	1.23	0.0%	43.5 ±5%	43.0	-1.1%	0.87 ±5%	0.85	-2.3%	1000	23.6	21.5	≥ 15	30	102.9
2/27/06	450MHz Brain	1.23 ±10%	1.21	-1.6%	43.5 ±5%	42.8	-1.6%	0.87 ±5%	0.83	-4.6%	1000	22.7	21.8	≥ 15	30	102.1

Note(s):
1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.

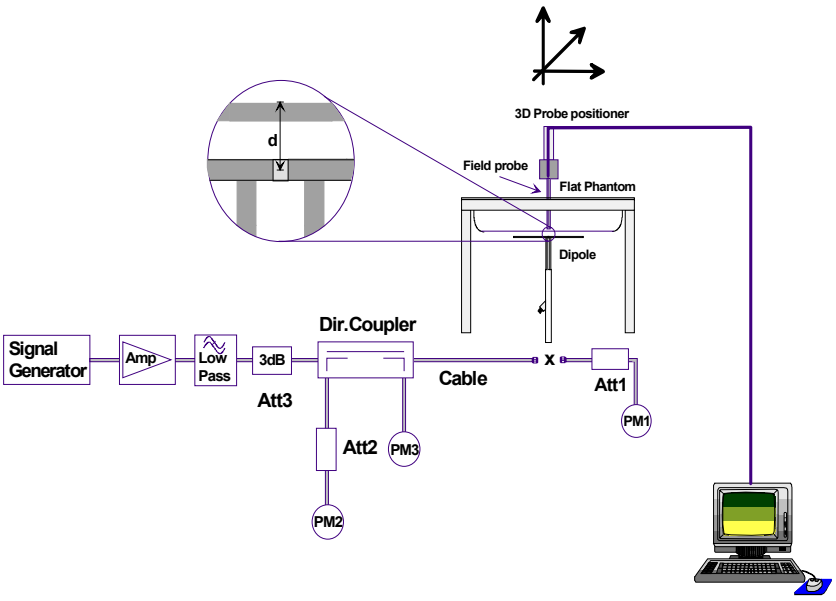
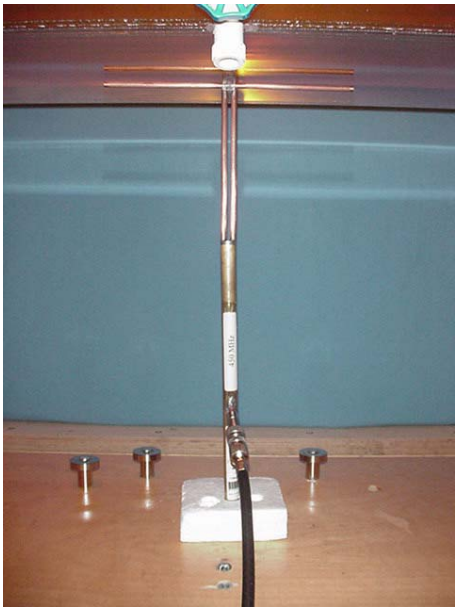


Figure 1. System Performance Check Setup Diagram



450 MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The 450MHz brain and body simulated tissue mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide is added and visual inspection is made to ensure air bubbles are not trapped during the mixing process. The fluid was prepared according to standardized procedures, and measured for dielectric parameters (permittivity and conductivity).

SIMULATED TISSUE MIXTURES		
INGREDIENT	**450 MHz Brain**	**450 MHz Body**
	System Check & DUT Evaluation	DUT Evaluation
Water	38.56 %	52.00 %
Sugar	56.32 %	45.65 %
Salt	3.95 %	1.75 %
HEC	0.98 %	0.50 %
Bactericide	0.19 %	0.10 %

9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10g)	4.0	20.0

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

10.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

POSITIONER: Stäubli Unimation Corp. Robot Model: RX60L
Repeatability: 0.02 mm
No. of axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: AMD Athlon XP 2400+
Clock Speed: 2.0 GHz
Operating System: Windows XP Professional

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic
Software: DASY4 software
Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

DASY4 Measurement Server

Function: Real-time data evaluation for field measurements and surface detection
Hardware: PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections: COM1, COM2, DAE, Robot, Ethernet, Service Interface

E-Field Probe

Model: ET3DV6
Serial No.: 1590
Construction: Triangular core fiber optic detection system
Frequency: 10 MHz to 6 GHz
Linearity: ±0.2 dB (30 MHz to 3 GHz)

Phantom(s)

Evaluation Phantom

Type: Side Planar Phantom
Shell Material: Plexiglas
Bottom Thickness: 2.0 mm ± 0.1 mm
Outer Dimensions: 75.0 cm (L) x 22.5 cm (W) x 20.5 cm (H); Back Plane: 25.7 cm (H)

Validation Phantom (≤ 450MHz)

Type: Planar Phantom
Shell Material: Plexiglas
Bottom Thickness: 6.2 mm ± 0.1 mm
Outer Dimensions: 86.0 cm (L) x 39.5 cm (W) x 21.8 cm (H)

11.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal to probe axis)
Dynamic Range:	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Surface Detection:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone

ET3DV6
E-Field Probe

12.0 SIDE PLANAR PHANTOM

The side planar phantom is constructed of Plexiglas material with a 2.0 mm shell thickness for face-held and body-worn SAR evaluations of portable radio transceivers. The side planar phantom is mounted on the side of the DASY4 compact system table.

Plexiglas Side Planar Phantom

13.0 VALIDATION PLANAR PHANTOM

The validation planar phantom is constructed of Plexiglas material with a 6.0 mm shell thickness for system validations at 450MHz and below. The validation planar phantom is mounted to the table of the DASY4 compact system.

Validation Planar Phantom

14.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Holder

15.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION					
x	Schmid & Partner DASY4 System	-	-	-		-
x	-DASY4 Measurement Server	00158	1078	N/A		N/A
x	-Robot	00046	599396-01	N/A		N/A
x	-DAE4	00019	353	15Jun05		15Jun06
	-DAE3	00018	370	08Feb06		08Feb07
	-ET3DV6 E-Field Probe	00016	1387	18Mar05		18Mar06
x	-ET3DV6 E-Field Probe	00017	1590	20May05		20May06
	-EX3DV4 E-Field Probe	00125	3547	14Feb06		14Feb07
	-300MHz Validation Dipole	00023	135	25Oct05		25Oct06
x	-450MHz Validation Dipole	00024	136	25Oct05		25Oct06
	-835MHz Validation Dipole	00022	411	**Brain**	30Mar05	30Mar06
				Body	12Apr05	12Apr06
	-900MHz Validation Dipole	00020	054	**Brain**	10Jun05	10Jun06
				Body	10Jun05	10Jun06
	-1800MHz Validation Dipole	00021	247	**Brain**	14Jun05	14Jun06
				Body	14Jun05	14Jun06
	-1900MHz Validation Dipole	00032	151	**Brain**	17Jun05	17Jun06
				Body	22Apr05	22Apr06
	-2450MHz Validation Dipole	00025	150	**Brain**	20Sep05	20Sep06
				Body	22Apr05	22Apr06
	-SAM Phantom V4.0C	00154	1033	N/A		N/A
	-Barski Planar Phantom	00155	03-01	N/A		N/A
x	-Plexiglas Side Planar Phantom	00156	161	N/A		N/A
x	-Plexiglas Validation Planar Phantom	00157	137	N/A		N/A
	HP 85070C Dielectric Probe Kit	00033	N/A	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
	Gigatronics 8652A Power Meter	00110	1835801	16Apr05		16Apr06
x	Gigatronics 8652A Power Meter	00008	1835267	29Apr05		29Apr06
x	Gigatronics 80701A Power Sensor	00012	1834350	12Sep05		12Sep06
	Gigatronics 80701A Power Sensor	00014	1833699	07Sep05		07Sep06
x	Gigatronics 80701A Power Sensor	00109	1834366	16Apr05		16Apr06
x	HP 8753ET Network Analyzer	00134	US39170292	04May05		04May06
x	HP 8648D Signal Generator	00005	3847A00611	29Apr05		29Apr06
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	12Apr05		12Apr06
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A

16.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**ci 1g**	**Uncertainty Value ±% (1g)**	**V_i or V_{eff}**
Measurement System						
Probe calibration	4.0	Normal	1	1	4.0	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0.8	Rectangular	1.732050808	1	0.5	∞
Integration time	2.6	Rectangular	1.732050808	1	1.5	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					**9.88**	
Expanded Uncertainty (k=2)					**19.77**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

MEASUREMENT UNCERTAINTIES (CONT.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V_i or V_{eff}
Measurement System						
Probe calibration	4.0	Normal	1	1	4.0	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0	Rectangular	1.732050808	1	0.0	∞
Integration time	0	Rectangular	1.732050808	1	0.0	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					**7.93**	
Expanded Uncertainty (k=2)					**15.87**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

17.0 REFERENCES

[1] Federal Communications Commission, “Radiofrequency radiation exposure evaluation: portable devices”, Rule Part 47 CFR §2.1093: 1999.

[2] Health Canada, “Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz”, Safety Code 6: 1999.

[3] Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[4] Industry Canada, “Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”, Radio Standards Specification RSS-102 Issue 2: November 2005.

[5] IEEE Standard 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”: December 2003.

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 02/27/2006

Face-Held SAR - Li-ion Battery (1150mAh) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

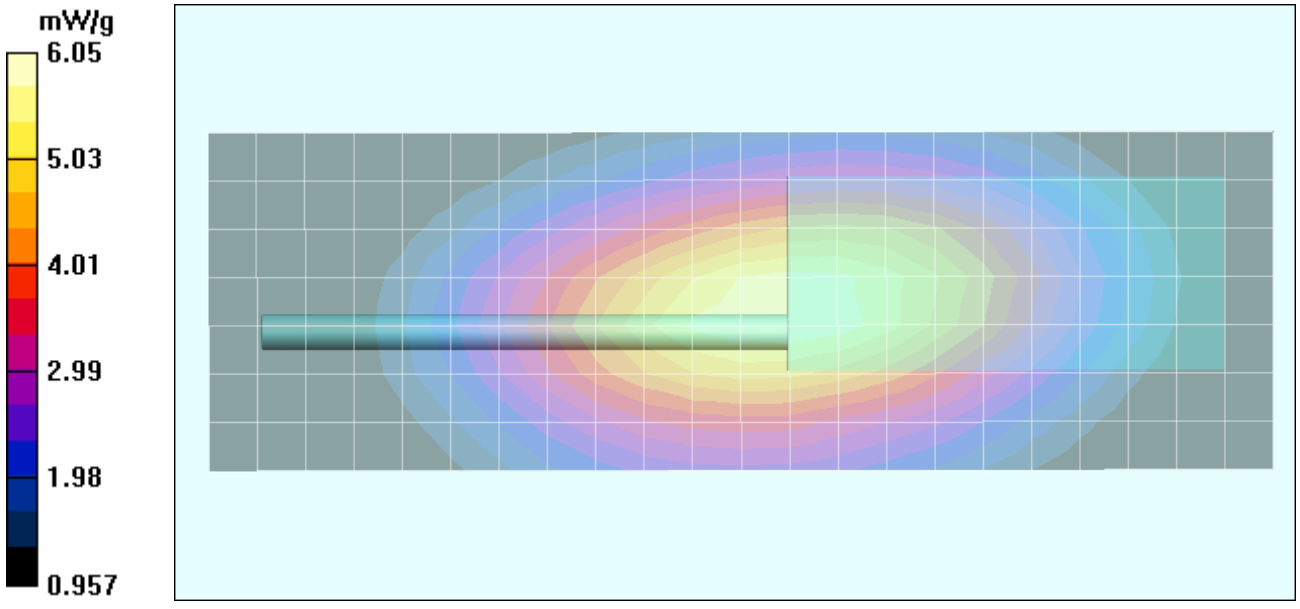
Ambient Temp: 22.7 °C; Fluid Temp: 21.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.9 Watts (Conducted)
7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LI)
Medium: HSL450 (σ = 0.83 mho/m; ε_r = 42.8; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.8, 7.8, 7.8); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Area Scan (8x23x1):
Measurement grid: dx=15mm, dy=15mm

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 82.3 V/m; Power Drift = -0.317 dB
Peak SAR (extrapolated) = 8.73 W/kg
SAR(1 g) = 5.79 mW/g; SAR(10 g) = 4.22 mW/g



Date Tested: 02/27/2006

Face-Held SAR - Li-ion Battery (2000mAh) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

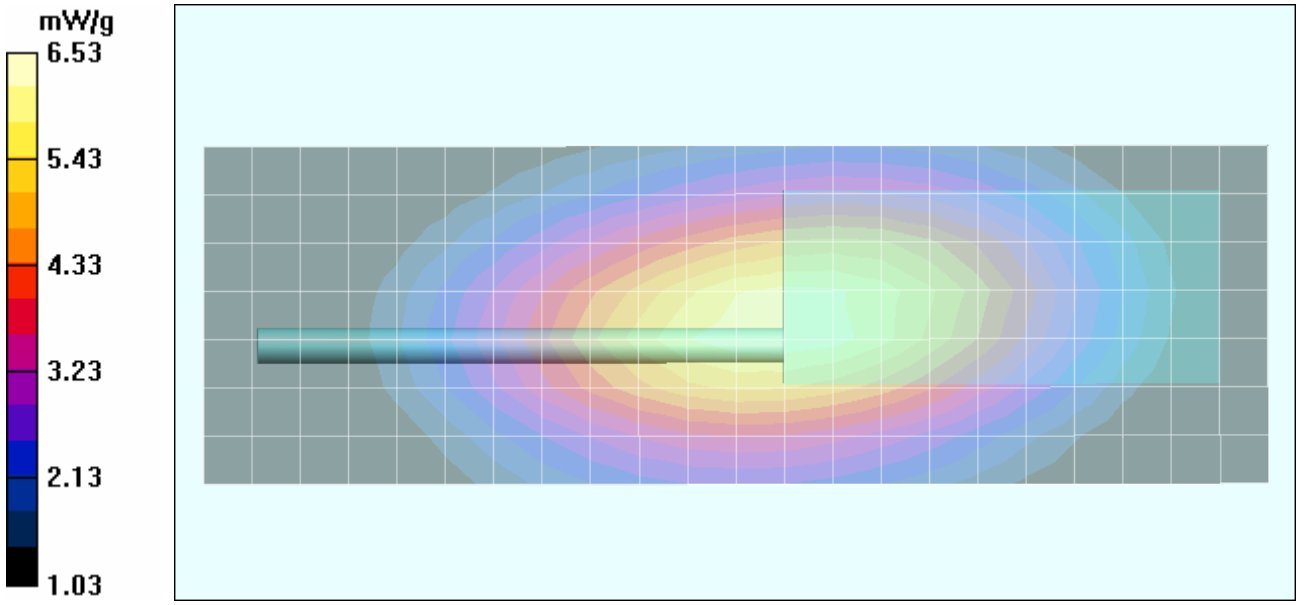
Ambient Temp: 22.7 °C; Fluid Temp: 21.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.9 Watts (Conducted)
7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)
Medium: HSL450 (σ = 0.83 mho/m; ε_r = 42.8; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.8, 7.8, 7.8); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Area Scan (8x23x1):
Measurement grid: dx=15mm, dy=15mm

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 86.0 V/m; Power Drift = -0.255 dB
Peak SAR (extrapolated) = 9.31 W/kg
SAR(1 g) = 6.25 mW/g; SAR(10 g) = 4.56 mW/g



Date Tested: 02/27/2006

Face-Held SAR - Li-ion IS Battery (3000mAh) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

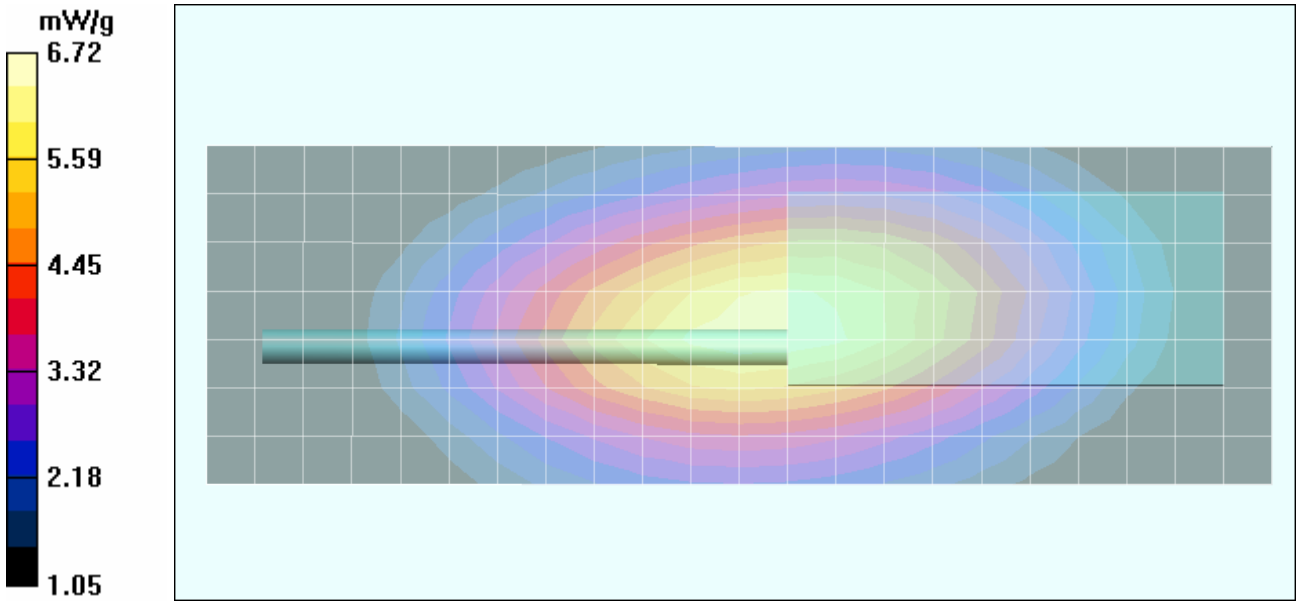
Ambient Temp: 22.7 °C; Fluid Temp: 21.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.9 Watts (Conducted)
7.4V 3000mAh Li-ion IS Battery Pack (P/N: FNB-V92LIIS)
Medium: HSL450 (σ = 0.83 mho/m; ε_r = 42.8; ρ = 1000 kg/m^3)

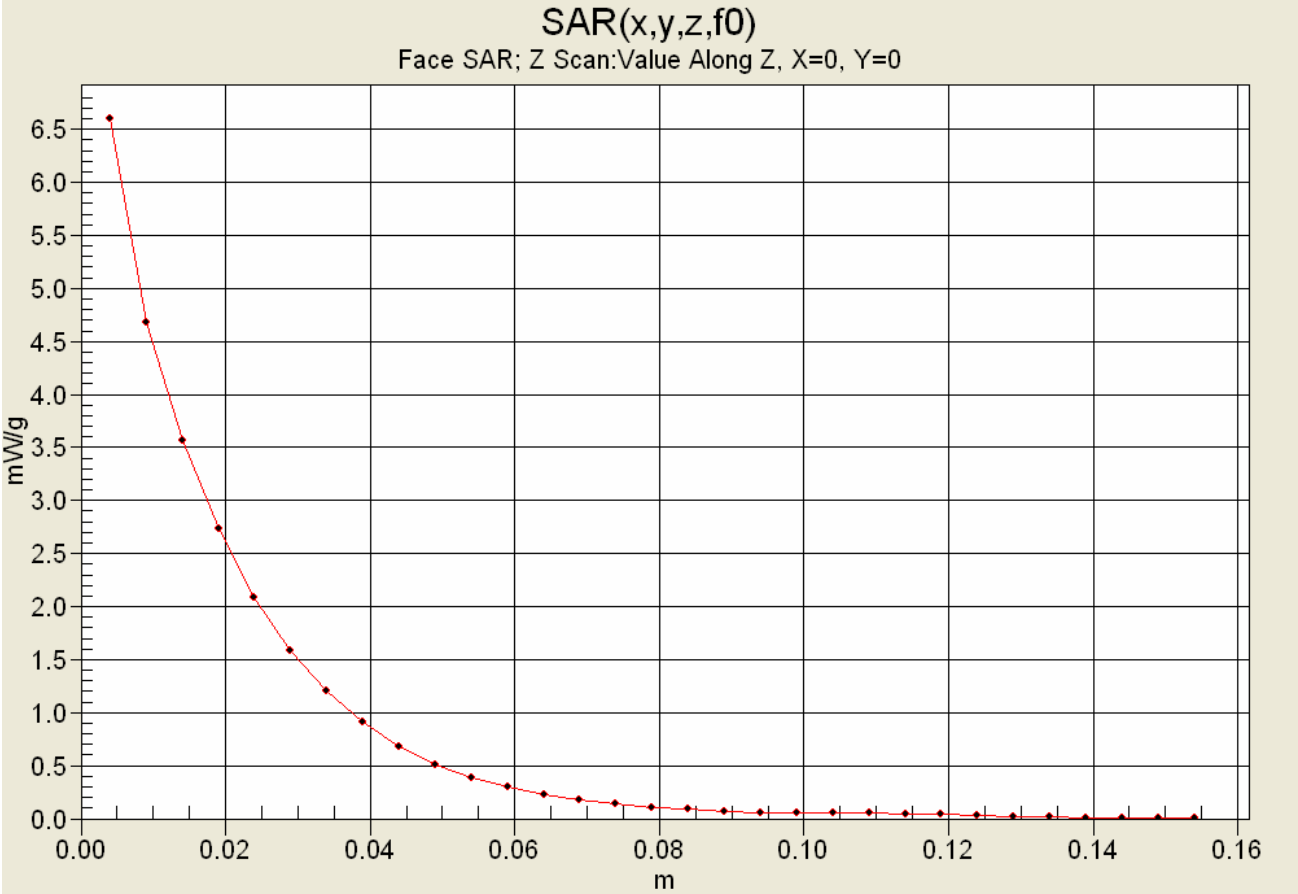
- Probe: ET3DV6 - SN1590; ConvF(7.8, 7.8, 7.8); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Area Scan (8x23x1):
Measurement grid: dx=15mm, dy=15mm

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 86.9 V/m; Power Drift = -0.177 dB
Peak SAR (extrapolated) = 9.58 W/kg
SAR(1 g) = 6.43 mW/g; SAR(10 g) = 4.7 mW/g



Z-Axis Scan



Date Tested: 02/27/2006

Face-Held SAR - Alkaline Battery Case (Duracell Procell) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

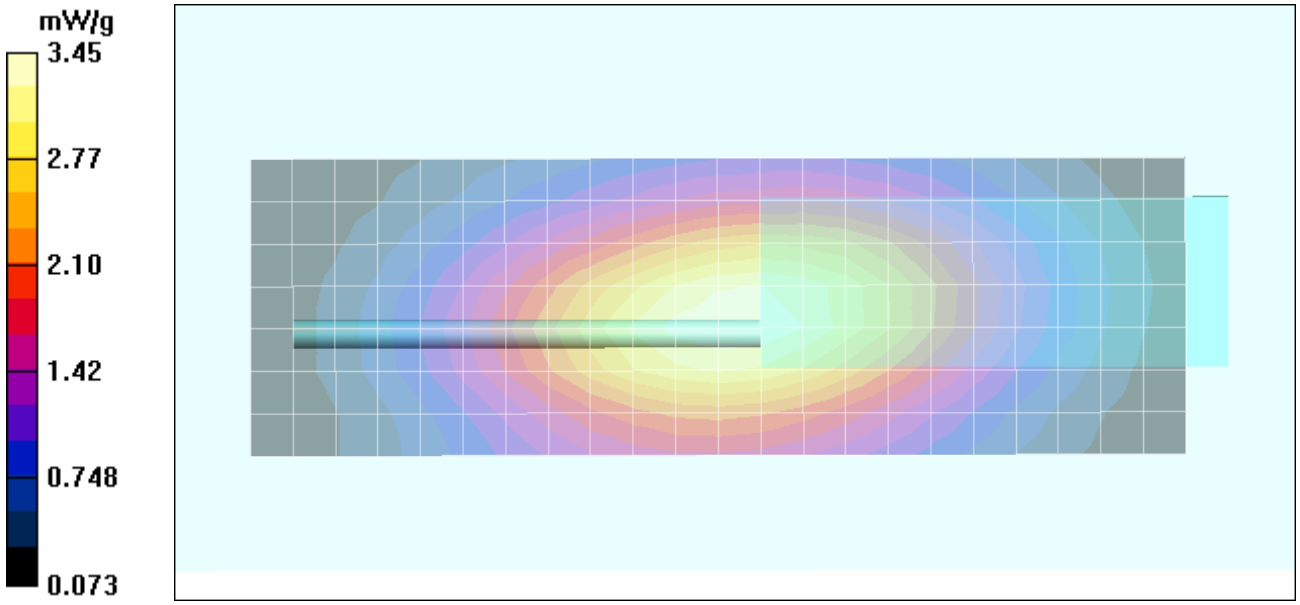
Ambient Temp: 22.7 °C; Fluid Temp: 21.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.5 Watts (Conducted)
9V AA Duracell Procell Alkaline Battery Pack (P/N: FBA-34)
Medium: HSL450 (σ = 0.83 mho/m; ε_r = 42.8; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.8, 7.8, 7.8); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Area Scan (8x23x1):
Measurement grid: dx=15mm, dy=15mm

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 60.8 V/m; Power Drift = -0.975 dB
Peak SAR (extrapolated) = 4.02 W/kg
SAR(1 g) = 2.70 mW/g; SAR(10 g) = 1.98 mW/g



Date Tested: 02/24/2006

Body-Worn SAR - Li-ion Battery (1150mAh) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Belt-Clip (P/N: CLIP-920); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

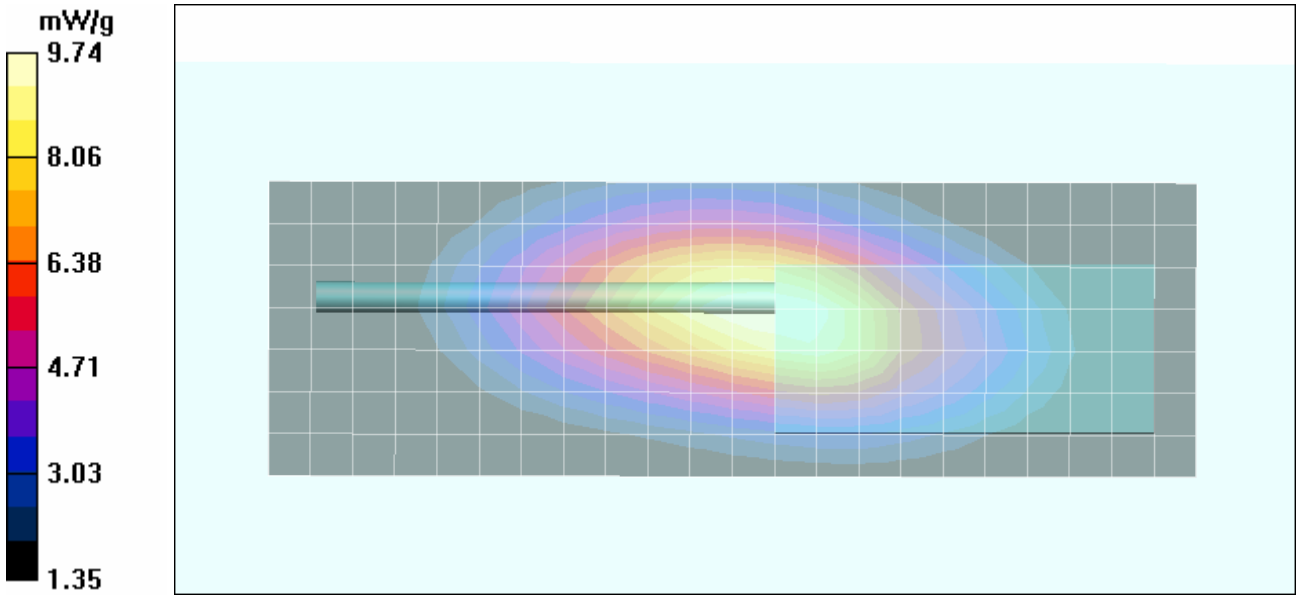
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.9 Watts (Conducted)
7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LI)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 101.7 V/m; Power Drift = -0.324 dB
Peak SAR (extrapolated) = 14.1 W/kg
SAR(1 g) = 9.39 mW/g; SAR(10 g) = 6.75 mW/g



Date Tested: 02/24/2006

Body-Worn SAR - Li-ion Battery (2000mAh) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Belt-Clip (P/N: CLIP-920); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

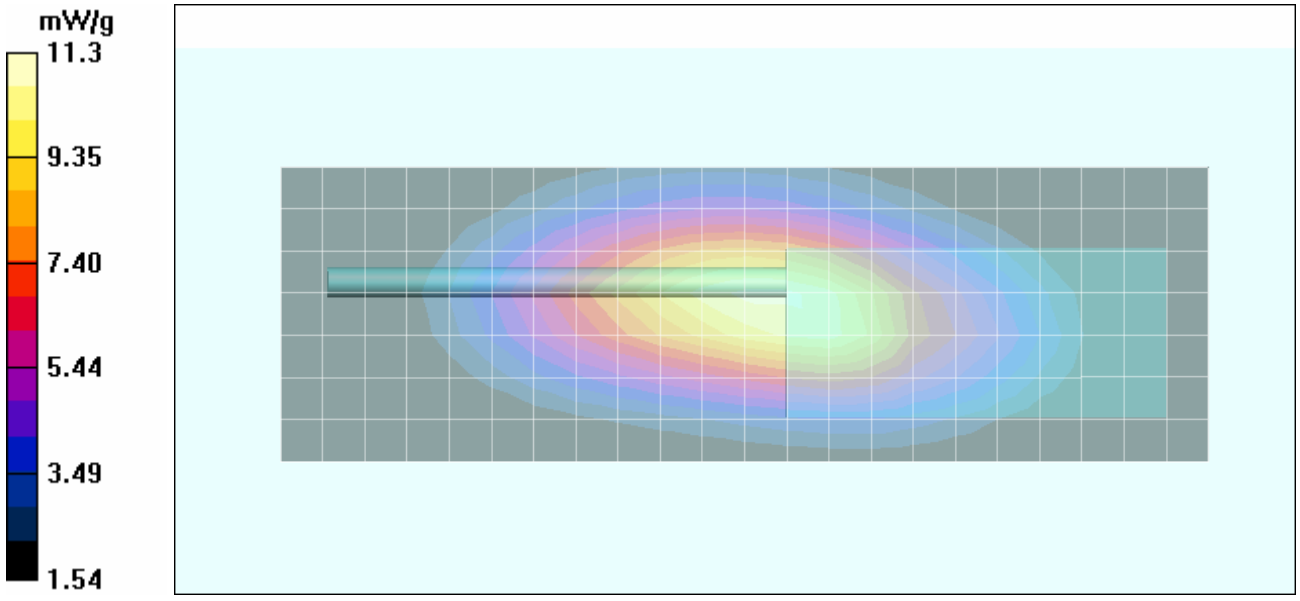
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.9 Watts (Conducted)
7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 112.0 V/m; Power Drift = -0.337 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 10.8 mW/g; SAR(10 g) = 7.76 mW/g



Date Tested: 02/24/2006

Body-Worn SAR - Li-ion IS Battery (3000mAh) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Belt-Clip (P/N: CLIP-920); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

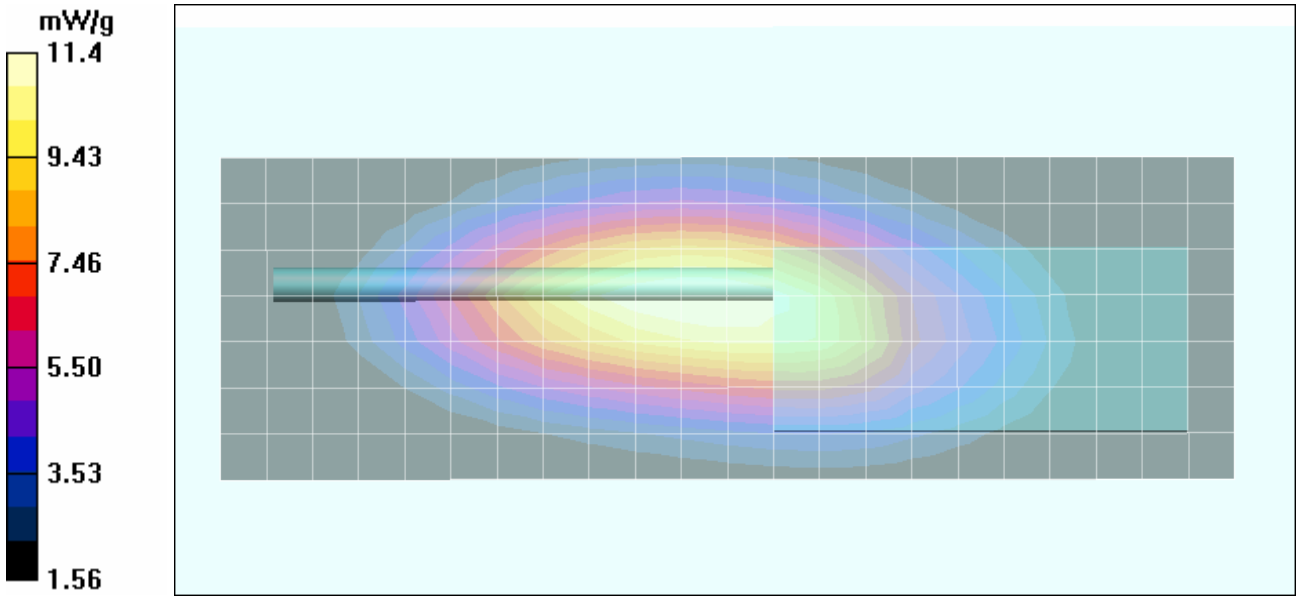
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.9 Watts (Conducted)
7.4V 3000mAh Li-ion IS Battery Pack (P/N: FNB-V92LIIS)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

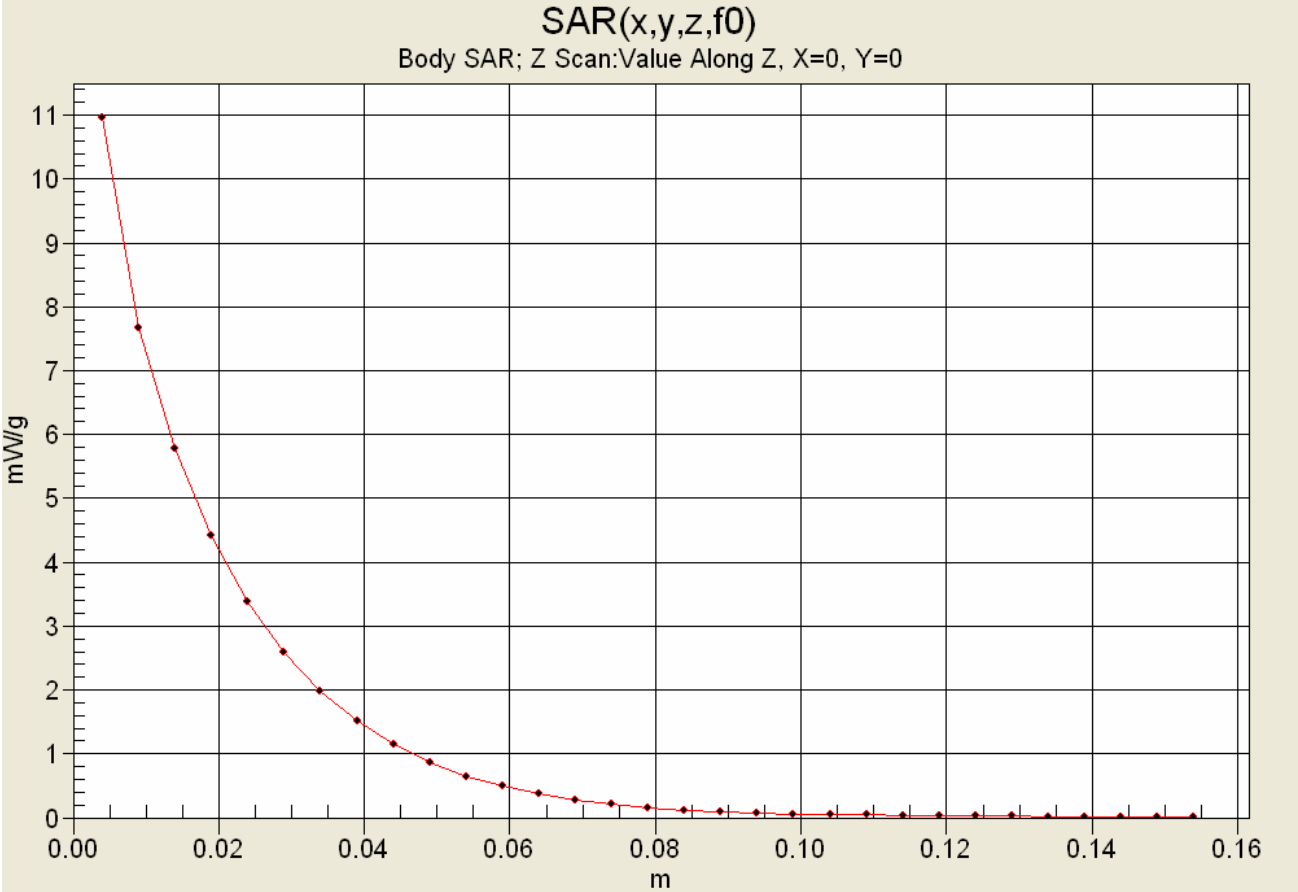
- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 108.7 V/m; Power Drift = -0.193 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 11.0 mW/g; SAR(10 g) = 7.86 mW/g



Z-Axis Scan



Date Tested: 02/24/2006

Body-Worn SAR - Alkaline Battery Case (Duracell Procell) - Whip Antenna (P/N: ATU-6A1) - Mid Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Belt-Clip (P/N: CLIP-920); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

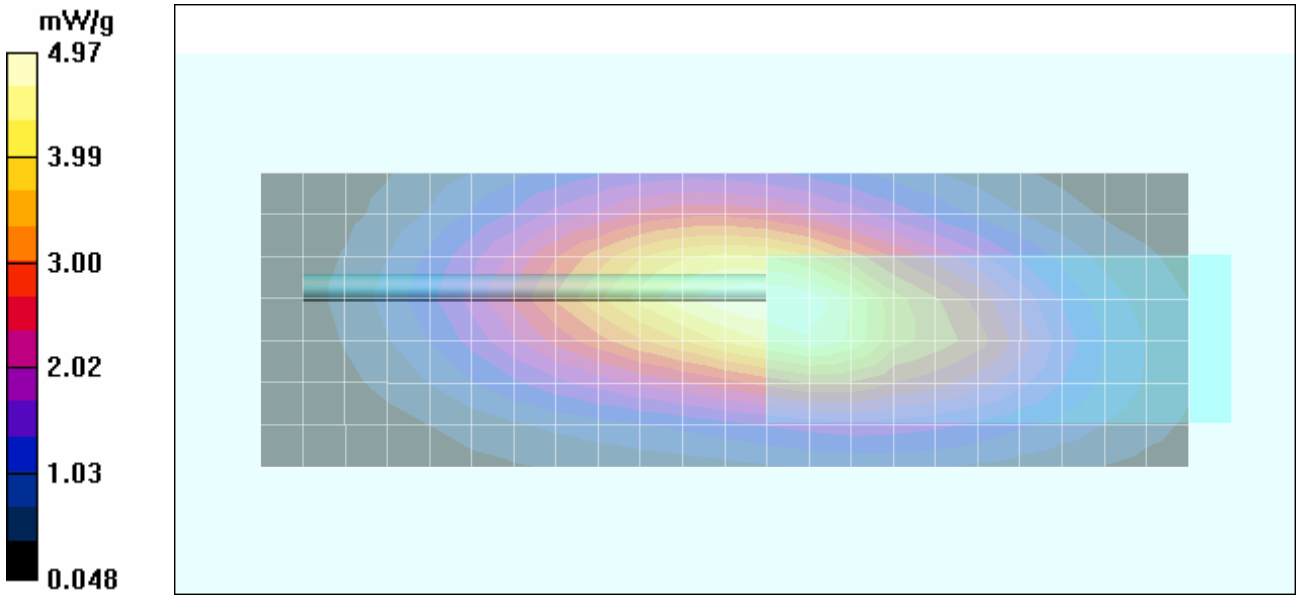
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 415 MHz; Duty Cycle: 1:1
RF Output Power: 4.5 Watts (Conducted)
9V AA Duracell Procell Alkaline Battery Pack (P/N: FBA-34)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 0.9 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 0.9 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 85.5 V/m; Power Drift = -0.835 dB
Peak SAR (extrapolated) = 9.50 W/kg
SAR(1 g) = 6.30 mW/g; SAR(10 g) = 4.48 mW/g



Date Tested: 02/24/2006

Body-Worn SAR - Li-ion Battery (2000mAh) - Whip Antenna (P/N: ATU-6A1) - High Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Belt-Clip (P/N: CLIP-920); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

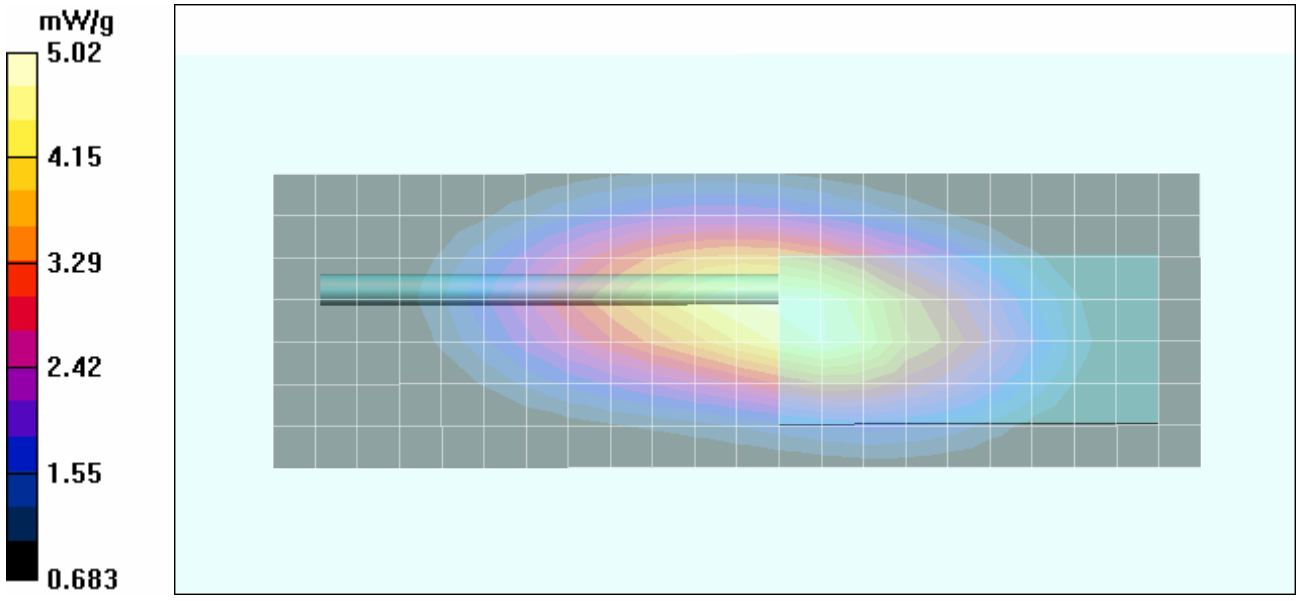
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 450 MHz; Duty Cycle: 1:1
RF Output Power: 5.0 Watts (Conducted)
7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - High Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - High Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 74.9 V/m; Power Drift = -0.486 dB
Peak SAR (extrapolated) = 7.32 W/kg
SAR(1 g) = 4.80 mW/g; SAR(10 g) = 3.42 mW/g



Date Tested: 02/24/2006

Body-Worn SAR - Li-ion Battery (2000mAh) - Whip Antenna (P/N: ATU-6A1) - Low Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Belt-Clip (P/N: CLIP-920); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

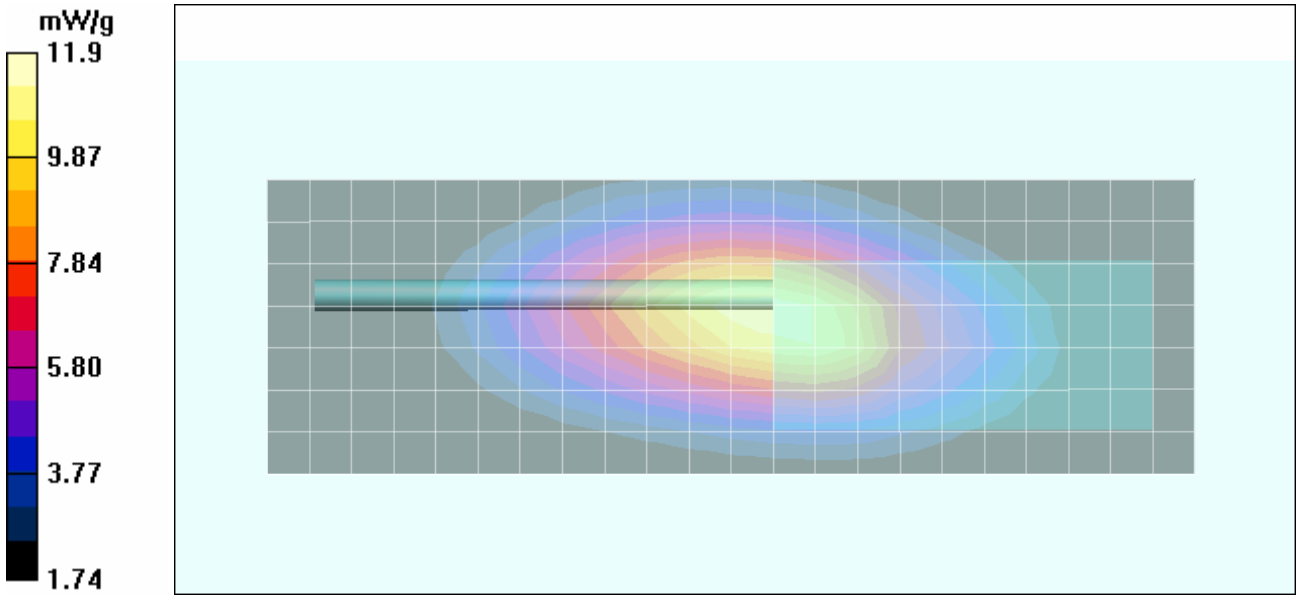
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 380 MHz; Duty Cycle: 1:1
RF Output Power: 4.8 Watts (Conducted)
7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

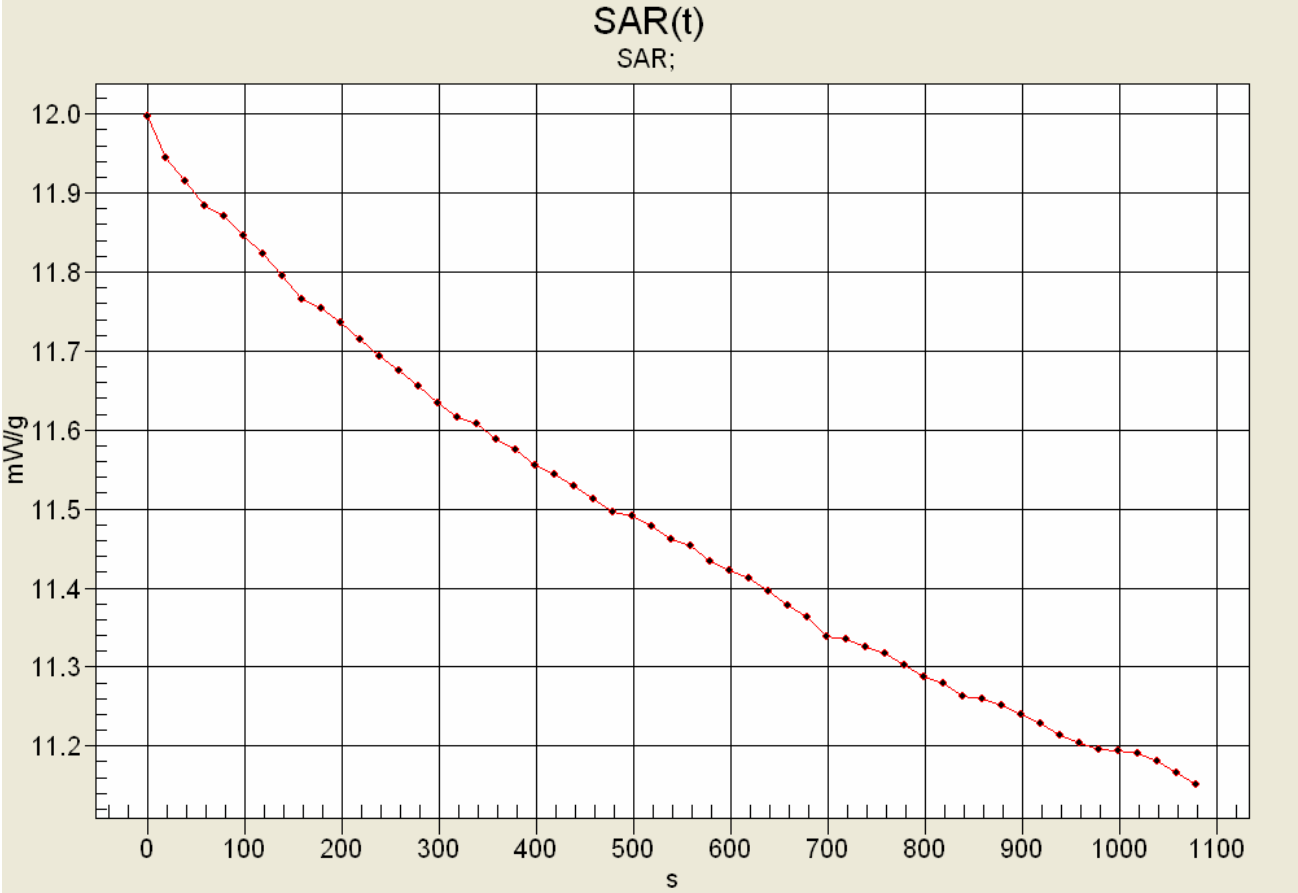
Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 1.2 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 113.4 V/m; Power Drift = -0.188 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 11.5 mW/g; SAR(10 g) = 8.3 mW/g



SAR-versus-Time Power Droop Evaluation

Body-Worn with Belt-Clip (P/N: CLIP-920)
Low Channel - 380 MHz
Whip Antenna (ATU-6A1)
Li-ion Battery Pack, 2000 mAh (P/N: FNB-V87LI)



Max SAR: 11.9967 mW/g
Low SAR: 11.1516 mW/g (-0.317 dB)
SAR after 340s: 11.6079 mW/g (-0.143 dB)
(340s = Zoom Scan Duration)
(1080s = Area Scan Duration)

Date Tested: 02/24/2006

Body-Worn SAR - Li-ion Battery (2000mAh) - Whip Antenna (P/N: ATU-6A1) - Low Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Leather Case with Detachable Swivel Belt-Loop (P/N: LCC-920S)
Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

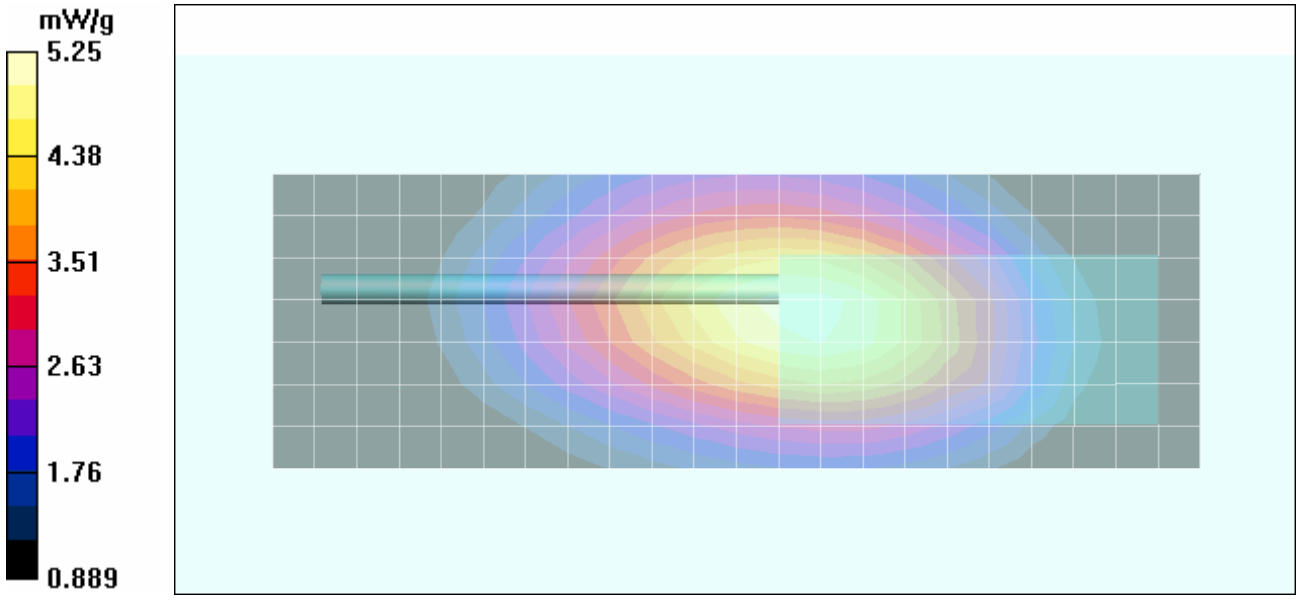
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 380 MHz; Duty Cycle: 1:1
RF Output Power: 4.8 Watts (Conducted)
7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 4.5 cm Leather Case & Swivel Belt-Loop Separation Distance to Planar Phantom - Low Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 4.5 cm Leather Case & Swivel Belt-Loop Separation Distance to Planar Phantom - Low Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 76.5 V/m; Power Drift = -0.244 dB
Peak SAR (extrapolated) = 7.26 W/kg
SAR(1 g) = 5.07 mW/g; SAR(10 g) = 3.8 mW/g



Date Tested: 02/24/2006

Body-Worn SAR - Li-ion Battery (2000mAh) - Whip Antenna (P/N: ATU-6A1) - Low Channel

DUT: Vertex Model: VX-P929-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6C000001

Body-Worn Accessory: Leather Case with Belt-Loop (P/N: LCC-920)
Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

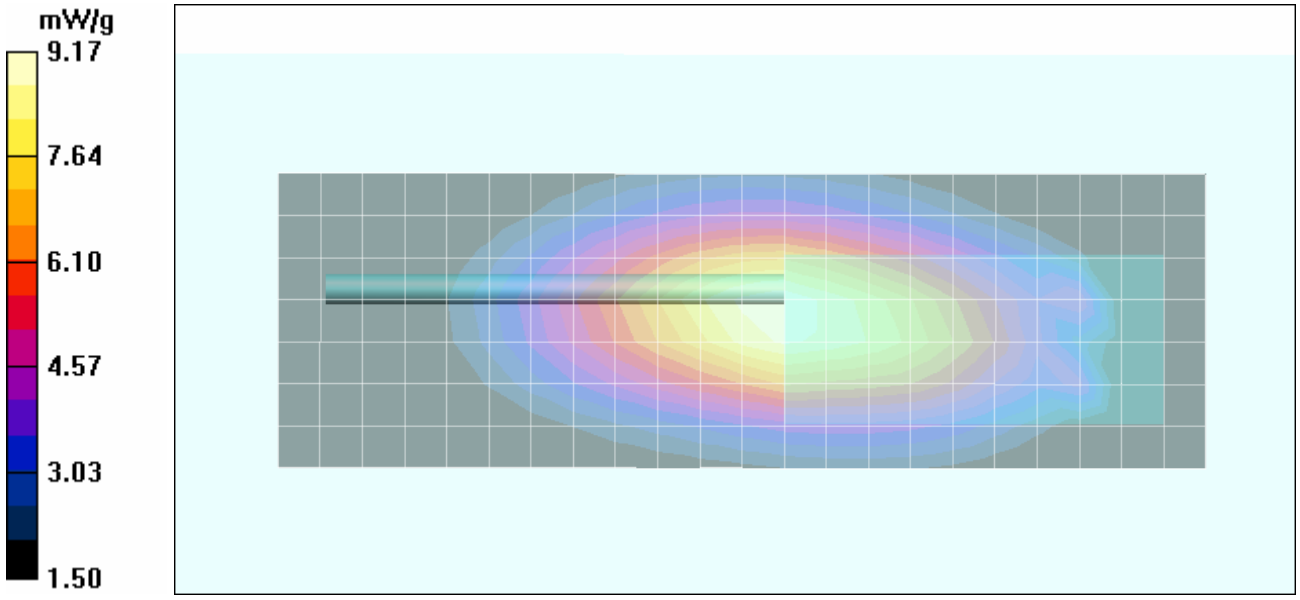
Ambient Temp: 23.6 °C; Fluid Temp: 22.1 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: FM UHF
Frequency: 380 MHz; Duty Cycle: 1:1
RF Output Power: 4.8 Watts (Conducted)
7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)
Medium: M450 (σ = 0.91 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7.7, 7.7, 7.7); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body-Worn SAR - 2.0 cm Leather Case & Belt-Loop Separation Distance to Planar Phantom - Low Channel
Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 2.0 cm Leather Case & Belt-Loop Separation Distance to Planar Phantom - Low Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 98.5 V/m; Power Drift = -0.179 dB
Peak SAR (extrapolated) = 13.0 W/kg
SAR(1 g) = 8.82 mW/g; SAR(10 g) = 6.45 mW/g



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 02/24/2006

System Performance Check (Brain) - 450 MHz Dipole

DUT: Dipole 450 MHz; Model: D450V2; Type: System Performance Check; Serial: 136; Calibrated: 10/25/2005

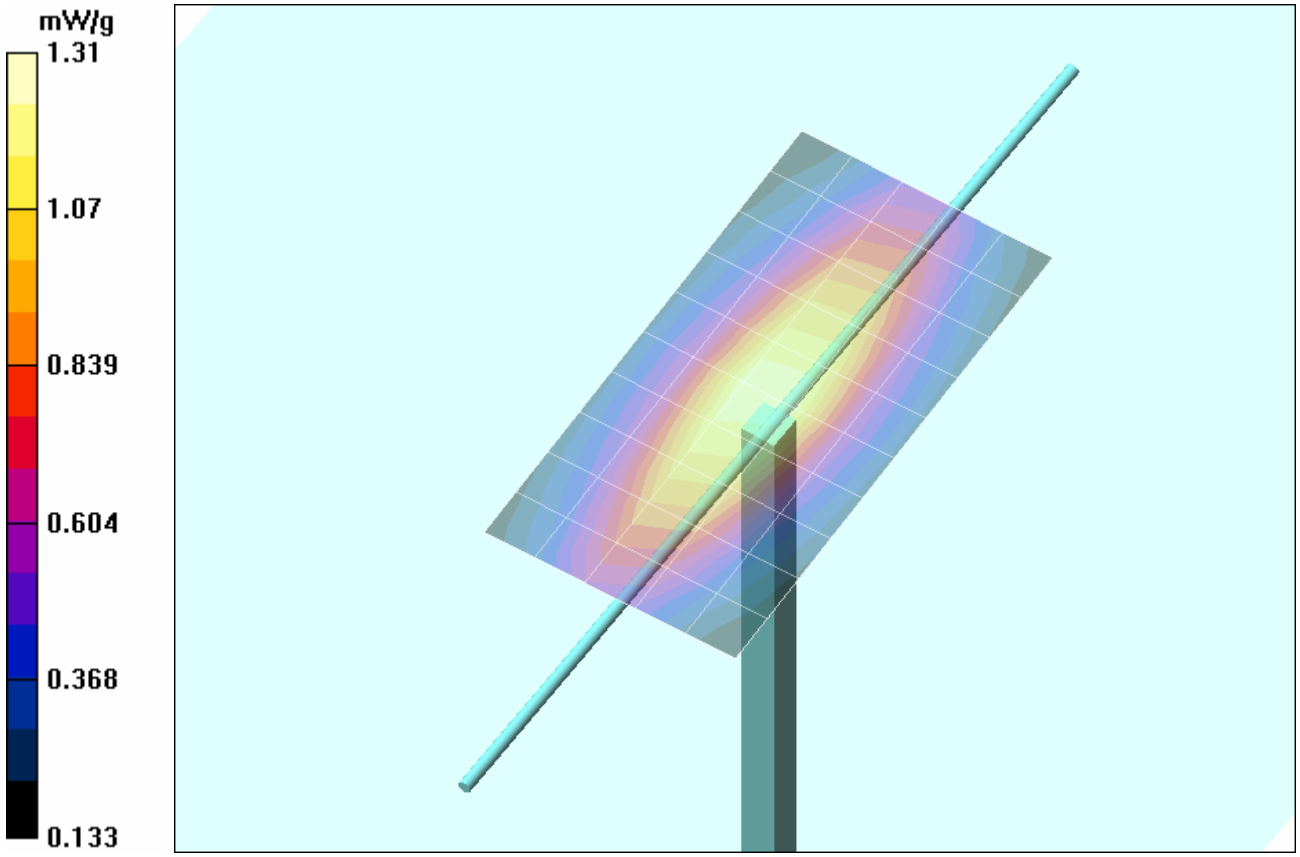
Ambient Temp: 23.6 °C; Fluid Temp: 21.5 °C; Barometric Pressure: 102.9 kPa; Humidity: 30%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450 (σ = 0.85 mho/m; ε_r = 43.0; ρ = 1000 kg/m^3)

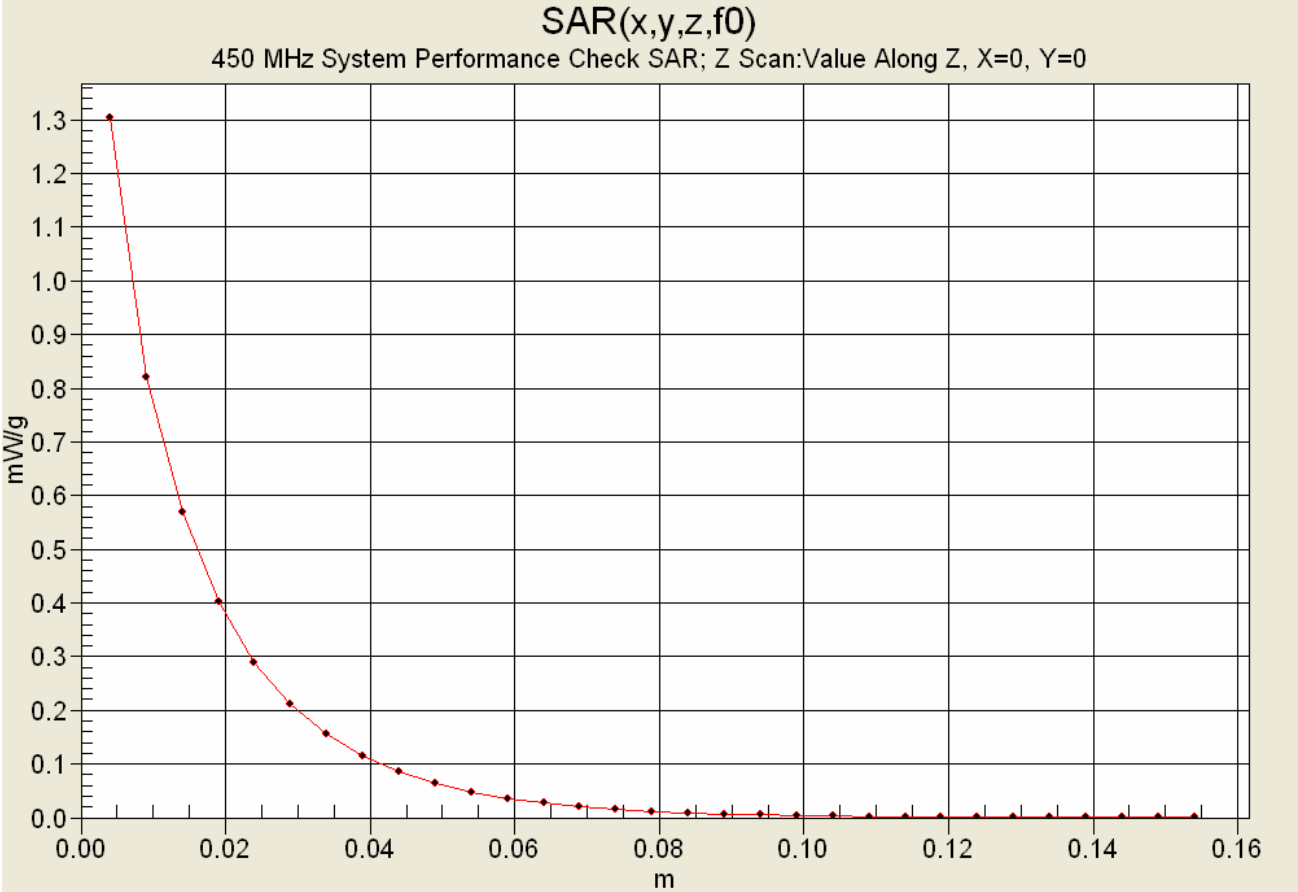
- Probe: ET3DV6 - SN1590; ConvF(7.8, 7.8, 7.8); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

450 MHz Dipole - System Performance Check/Area Scan (6x11x1):
Measurement grid: dx=15mm, dy=15mm

450 MHz Dipole - System Performance Check/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.5 V/m; Power Drift = -0.091 dB
Peak SAR (extrapolated) = 2.08 W/kg
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.800 mW/g



Z-Axis Scan



Date Tested: 02/27/2006

System Performance Check (Brain) - 450 MHz Dipole

DUT: Dipole 450 MHz; Model: D450V2; Type: System Performance Check; Serial: 136; Calibrated: 10/25/2005

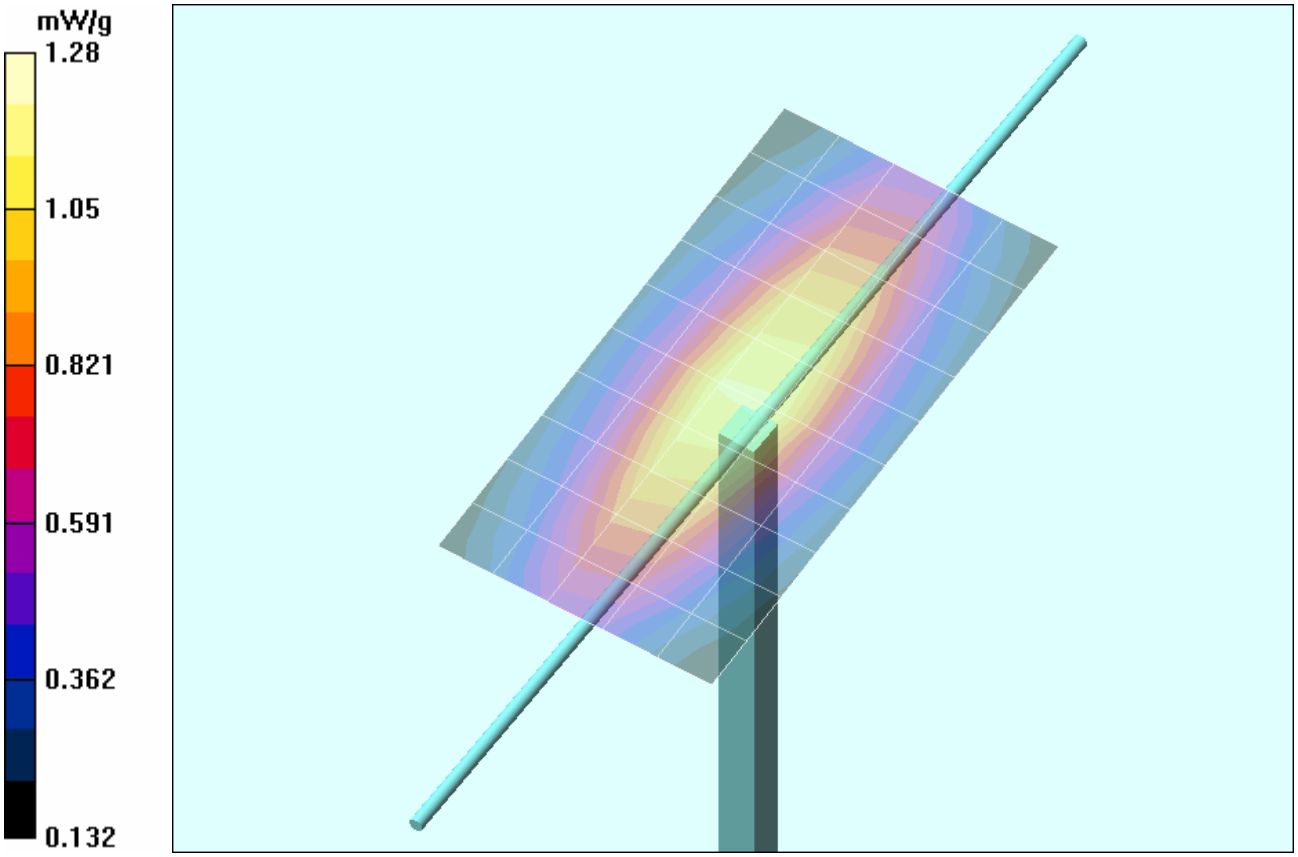
Ambient Temp: 22.7 °C; Fluid Temp: 21.8 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450 (σ = 0.83 mho/m; ε_r = 42.8; ρ = 1000 kg/m^3)

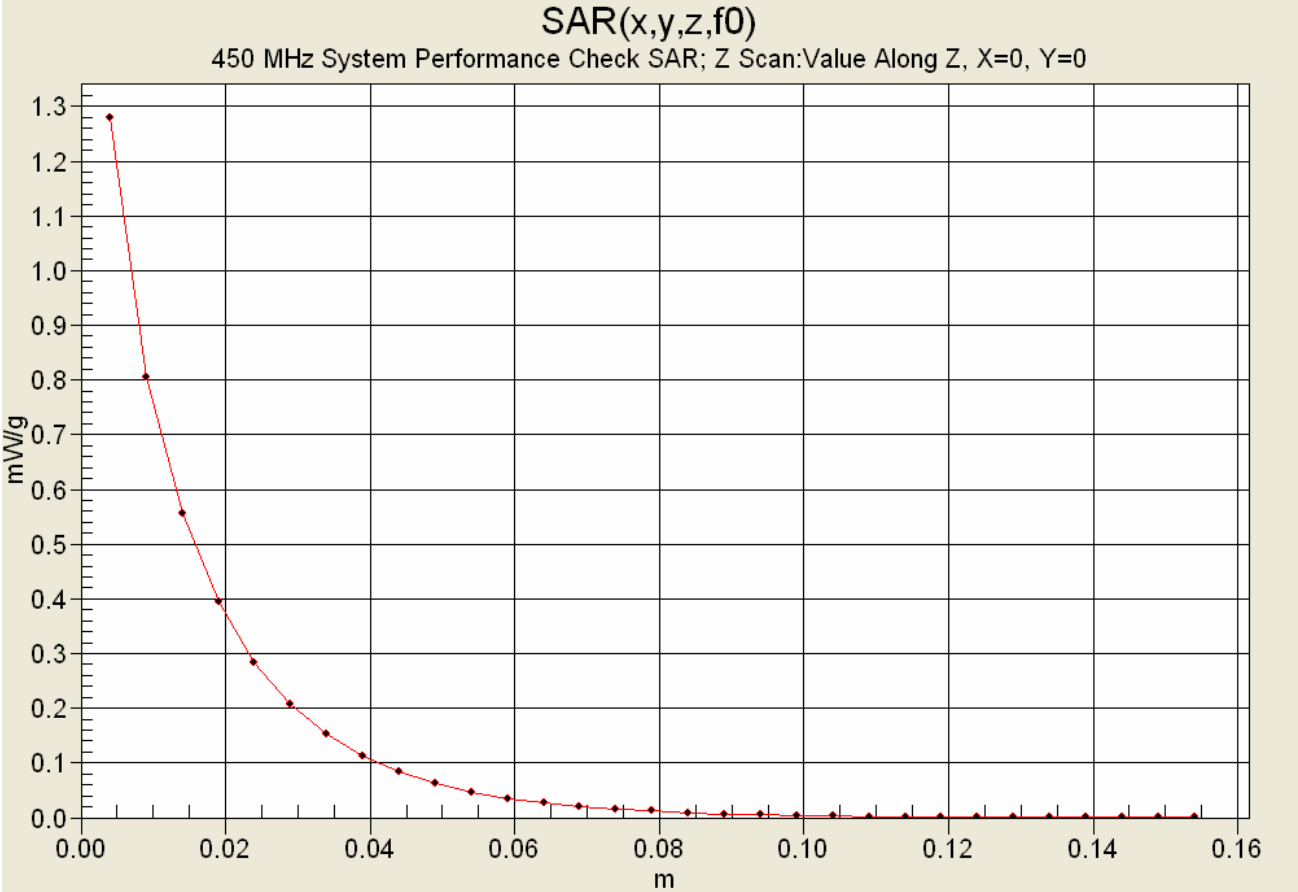
- Probe: ET3DV6 - SN1590; ConvF(7.8, 7.8, 7.8); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

450 MHz Dipole - System Performance Check/Area Scan (6x11x1):
Measurement grid: dx=15mm, dy=15mm

450 MHz Dipole - System Performance Check/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.1 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 2.05 W/kg
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.784 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

450 MHz System Performance Check (Brain)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Fri 24/Feb/2006
Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.3500	44.70	0.87	45.46	0.77
0.3600	44.58	0.87	44.98	0.77
0.3700	44.46	0.87	45.10	0.78
0.3800	44.34	0.87	44.73	0.79
0.3900	44.22	0.87	44.36	0.79
0.4000	44.10	0.87	44.01	0.80
0.4100	43.98	0.87	43.91	0.82
0.4200	43.86	0.87	43.63	0.83
0.4300	43.74	0.87	43.54	0.84
0.4400	43.62	0.87	43.13	0.84
0.4500	43.50	0.87	42.98	0.85
0.4600	43.45	0.87	42.72	0.86
0.4700	43.40	0.87	42.51	0.86
0.4800	43.34	0.87	42.38	0.87
0.4900	43.29	0.87	42.02	0.88
0.5000	43.24	0.87	41.99	0.89
0.5100	43.19	0.87	41.81	0.89
0.5200	43.14	0.88	41.44	0.91
0.5300	43.08	0.88	41.43	0.92
0.5400	43.03	0.88	41.37	0.92
0.5500	42.98	0.88	41.08	0.93

450 MHz DUT Evaluation (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Fri 24/Feb/2006
Frequency(GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.3500	57.70	0.93	57.59	0.83
0.3600	57.60	0.93	57.13	0.84
0.3700	57.50	0.93	57.37	0.85
0.3800	57.40	0.93	57.26	0.86
0.3900	57.30	0.93	56.71	0.86
0.4000	57.20	0.93	56.55	0.87
0.4100	57.10	0.93	56.49	0.89
0.4200	57.00	0.94	56.23	0.89
0.4300	56.90	0.94	56.40	0.90
0.4400	56.80	0.94	56.12	0.90
0.4500	56.70	0.94	55.71	0.91
0.4600	56.66	0.94	55.49	0.92
0.4700	56.62	0.94	55.32	0.93
0.4800	56.58	0.94	54.95	0.93
0.4900	56.54	0.94	55.07	0.95
0.5000	56.51	0.94	54.99	0.95
0.5100	56.47	0.94	54.65	0.96
0.5200	56.43	0.95	54.60	0.97
0.5300	56.39	0.95	54.58	0.98
0.5400	56.35	0.95	54.45	0.99
0.5500	56.31	0.95	54.33	1.00

450 MHz System Performance Check & DUT Evaluation (Face)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Mon 27/Feb/2006
Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.3500	44.70	0.87	45.66	0.75
0.3600	44.58	0.87	45.19	0.76
0.3700	44.46	0.87	45.01	0.77
0.3800	44.34	0.87	44.33	0.77
0.3900	44.22	0.87	44.19	0.78
0.4000	44.10	0.87	43.78	0.79
0.4100	43.98	0.87	43.62	0.80
0.4200	43.86	0.87	43.31	0.81
0.4300	43.74	0.87	43.21	0.82
0.4400	43.62	0.87	43.08	0.83
0.4500	43.50	0.87	42.79	0.83
0.4600	43.45	0.87	42.43	0.84
0.4700	43.40	0.87	42.52	0.85
0.4800	43.34	0.87	42.14	0.86
0.4900	43.29	0.87	42.09	0.87
0.5000	43.24	0.87	41.83	0.87
0.5100	43.19	0.87	41.63	0.88
0.5200	43.14	0.88	41.49	0.89
0.5300	43.08	0.88	41.27	0.90
0.5400	43.03	0.88	40.98	0.91
0.5500	42.98	0.88	40.97	0.92